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Eco-Design Toolbox

Helpful hints for Green Building Design



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INTRODUCTION

- Our helpful hints section has been updated to include information about how to be environmentally responsible when constructing or renovating buildings or constructing new building projects, and how to reduce the use of fuels such as electricity, gas and oil once buildings are occupied.
- The energy used by buildings is influenced by three main factors:
 - Building fabric (25%)
 - Building services (25%)
 - Building occupants' behaviour (50%)

"Sustainable Energy Authority Victoria's 'Building Energy Brief for Commercial and Public Buildings' (Version .3, Jan 2003)"
- While it is critical to ensure that minimal energy is consumed by a building through intelligent design of the fabric and services, it is as equally important that occupants use services in a responsible way.
- EnvironArc Design is committed to supporting innovative and environmentally responsible solutions when designing building projects.
- EnvironArc Design's aim is to design healthy and vibrant buildings that minimise their carbon footprint, while reducing health risks to occupants and the environment by the presence of harmful emissions and air pollutants. This will not only improve the quality of everyday life, but will also reduce the drain on the planet's resources.
- There is a wealth of information now available on the internet and from other sources on how to reduce the impact of buildings on the environment. EnvironArc Design has compiled some handy hints and Fact Sheets for you to use as a starting point when both designing and constructing a building project and some tips on how to manage it after it is occupied.
- Many environmental requirements are now mandatory through legislation such as the Building Code of Australia. New housing in South Australia is required to achieve a 5 star energy efficiency rating. There are many additional features or practices that can easily be incorporated into the design of a building to vastly improve their energy performance.
- EnvironArc Design has summarised some of the key features from these and many other sources in our Fact Sheets. This is a sample only of some the key features that need to be addressed when designing and building a new project.
- We have provided some basic information and top tips to help you start thinking about this important topic. The subjects that encapsulate the full subject of environmentally responsible design are many and can be somewhat daunting but your efforts will be greatly rewarded.
- These ideas and techniques can have a major impact on the energy required to run your building. The initial cost of your project will be minimal compared to the overall cost it will take to provide energy, and maintain it over its life cycle. The decisions made at the early stages will have a major impact on both the initial and long-term running costs.
- EnvironArc Design can help you find your way through this important and complex subject. We can help you reach your goals of achieving a responsible design solution for your home or building that will meet the rigours of an increasingly environmentally sensitive world.



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DESIGNING BUILDINGS TO THE ENERGY PROVISIONS AS PRESCRIBED BY THE BUILDING CODE OF AUSTRALIA (BCA)

The Building Code of Australia (BCA) prescribes the minimum legislative requirements for energy provisions for new or renovated buildings. The Building Code of Australia aims to eliminate the worst energy performance practices.



However, it does not cover the broader impacts a building has on the environment and the community, the way it is constructed, the materials used in construction, or how it is managed and utilised after completion. The BCA aims to reduce the use of electricity, gas, oil or other fuels used to provide services in buildings, but it does not address:

- embodied energy, i.e. energy used in manufacturing building materials or constructing a building.
- the broader impact of energy use by the occupants, including travel, ongoing management practices, external and internal environmental quality, emissions from materials used in the building process etc.
 - portable appliances, such as computers or fridges.





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HOW TO MEASURE YOUR EXISTING BUILDING'S ENERGY AND ENVIRONMENTAL PERFORMANCE

■ "IF YOU CAN'T MEASURE IT, YOU CAN'T MANAGE IT!"

There are excellent resources available on the internet which provide some very useful information about the performance of energy in commercial or domestic buildings.

These include:

- NABERS (National Australian Built Environment Rating System) is a performance-based rating system for existing buildings and rates a building on the basis of its impacts on the environment. It provides a simple indication of how well you are managing these environmental impacts compared with your peers and neighbours.



- NABERS now incorporates the Australian Building Greenhouse Rating (ABGR), which has been re-named NABERS. It was initially developed to assess energy usage of office buildings but it now been extended to include other building categories such as homes and hotels and retail buildings.
- The scheme assists home or office building owners and tenants reduce energy use and costs, improve the quality of indoor environments, reduce water usage and reduce greenhouse emissions.

- By using the simple Rating Calculator available through their website, you can undertake a simple self-assessment to determine how your building or home is performing across a range of measures including energy, water, indoor environment quality and waste management.
- The information provided by this calculator is a guide only a buildings overall performance and cannot be used to promote the performance of your building.
- In order to obtain an official rating for an office building you will need to engage a third party NABERS Accredited Assessor, who will make a detailed assessment of your premises. Once this has been done you will receive a certificate and the NABERS rating logo, which you can use to promote your rating. A list of assessors can be found at the NABERS website.
- To assess the energy rating for an office all that is needed are the previous 12 months of energy consumption from all sources, and other details such as the number of occupants, number of computers, net lettable area and the hours of occupancy.
- The Home Rating calculator requires details of the last 12 months of energy and water use plus some other basic information such as number of occupants, weeks of occupancy and postcode.





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ENERGY AUDITS

- You can discover ways to reduce energy consumption, conserve fossil fuels, achieve operational and cost efficiencies and reduce greenhouse gas emissions by undertaking an energy audit.
- An energy audit undertaken under AS/NZS 3598:2000 is an investigation of energy use in a defined area or site. It provides the means to identify where energy is being used and at what cost. It also sets out a program for changes to reduce ongoing consumption.
- Energy Audits:
 - Measure how buildings/sites are performing
 - Identify where energy is being used
 - Identify where energy can be saved and the cost benefit
 - Provide a framework to reduce energy consumption
 - Provide an evaluation/confirmation of load profile data
 - Provide an itemised list of recommendations to reduce energy consumption, the cost (if applicable), and the benefits in environmental or financial terms.
- An energy audit can be done in-house with the assistance of tools and resources readily available on the internet. Another option is to employ external auditors who are experienced and familiar with conducting energy audits.
- Three levels of audits are prescribed under the Australian Standard AS 3598:2000.
- An audit undertaken in accordance with the standard will involve an analysis of a building or site and the energy consumption records from which a report will be prepared, and will, depending on the level of the audit undertaken, include the following information:
 - Examination of energy consumption and sources
 - Analysis of energy use patterns
 - Consideration of building fabric, site services, their controls and major energy using processes
 - Analysis of energy performance against relevant benchmarks
 - An analysis of the type and configuration of services, including
 - lighting and lighting control
 - air conditioning and ventilation plant
 - office Equipment
 - hot Water
 - Recommendations for the implementation of Energy Management Program
 - Recommendations for capital works projects to reduce energy consumption including predicted annual energy and financial savings
 - Recommendations for changes to develop an Energy Management Plan, which provides guidance for in-house management practices and staff training
 - Recommendations for changes to maintenance practices and operating procedures.
- The report will enable you to implement changes on the basis of available funding on a priority basis.





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DESIGNING TO THE GREEN STAR SYSTEM DEVELOPED BY THE GREEN BUILDING COUNCIL OF AUSTRALIA

- DESIGNING TO THE GREEN STAR RATING SYSTEM DEVELOPED BY THE GREEN BUILDING COUNCIL OF AUSTRALIA
 - By designing a building to the standards of the Green Building Council of Australia (GBCA), you can ensure that you are adopting the current world best practice for sustainable development.
 - The Green Building Council of Australia's objective is to promote sustainable development and the transition of the property industry towards sustainability by promoting green building programs, technologies, design practices and operations. A key priority of the GBCA has been the development of the Green Star rating system.
 - The GBCA Green Star rating system looks at a broad range of environmental issues in relation to the building process. It requires a commitment to the process by building owners or managers, from conception to the operational phases after completion.
 - The GBCA has developed a number of rating tools, including the following:
 - Green Star Office Design
 - Green Star Office As Built
 - Green Star Office Interiors
 - Green Star Office Existing Building
 - Green Star Shopping Centre Design
 - Green Star Healthcare
 - Green Star Education
- The nine categories included in the Green Star Rating Tools are
 - Management
 - Indoor Environment Quality
 - Energy
 - Transport
 - Water
 - Materials
 - Land Use & Ecology
 - Emissions
 - Innovation
- A design, project or building cannot publically claim a Green Star rating unless the GBCA has certified the rating.
- While it might not be a requirement for a project to be formally certified by the GBCA, the processes and principles established by the GBCA can readily be applied and adapted to any building project.
- The Green Star rating tools are available on the GBCA website and organisations are actively encouraged to do an assessment on projects to predict the Green Star rating. These self assessments cannot be promoted or advertised in public.





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ICLEI – LOCAL GOVERNMENTS FOR SUSTAINABILITY

ICLEI

- ICLEI is an international, not-for-profit association of local governments and local government organisations, which has made a commitment to sustainable development.
- There are more than 1000 local governments in 67 countries committed to sustainable development.
- The association's mission is to build a movement of councils committed to achieving tangible improvements in environmental conditions through the cumulative impact of local action.
- Regional activities in Australia are coordinated through the Oceania Secretariat, Local Governments for Sustainability. The ICLEI head office is located in the offices of the City of Melbourne and staff are located in other states, including South Australia.
- ICLEI has three main areas of work: Cities for Climate Protection (CCP), the Water Campaign and Integrated Sustainability Services.

CCP AUSTRALIA

- The Cities for Climate Protection Australia program is an innovative international campaign that helps local governments and their communities reduce greenhouse gas emissions and their impact on the environment.
- CCP is delivered through collaboration between ICLEI Oceania and the Australian Government.
- Some of the CCP projects include:
 - Adaption Initiative which aims to prepare Local Governments for the impact of climate change through infrastructure and internal risk management.
 - Information Management which aims to improve the management of Information and Data for Emissions and Energy.
 - Local Government Fleets which aims to conduct a nationwide survey on fleets and fleet management, with the aim of reducing greenhouse gas emissions.
 - Sustainable Public Lighting in Australia which aims to accelerate the uptake of sustainable public lighting technologies and practices.
 - Sustainable Purchasing which focuses on purchasing that balances environmental, social and economic impacts and through a preference for products or services that not only are selected based on best value, but also just as importantly have the least detrimental effect on the environment.
 - Switch IT Over which focuses on purchasing Green Office Equipment.
 - Sustainable Transport which focuses on a wide range of actions and technologies that reduce the negative impacts, and improve the positive impacts of our transport choices.





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ICLEI – LOCAL GOVERNMENTS FOR SUSTAINABILITY (Continued)

WATER CAMPAIGN

- The Water Campaign is an international freshwater management program which builds the capacity of local governments to reduce water consumption and improve local water quality.

INTEGRATED SUSTAINABILITY SERVICES

- Integrated Sustainability Services (ISS) draws on the strengths, resources and skills of ICLEI Sustainability Services and the Centre for Public Agency Sustainability Reporting to deliver increased capacity for integrating sustainability into planning, monitoring and reporting for public agencies.

EnvironArc's Services

- How can EnvironArc Design help Local Governments participate in the ICLEI and CCP program?
- EnvironArc Design can provide assistance by:
 - Calculating your Carbon Footprint, Greenhouse Gas Emissions and Energy Data in accordance with the National Greenhouse and Energy Reporting Act 2007 and National Carbon Offset Standard Discussion Paper, December 2008, Australian Government Department of Climate Change. The measurement conforms to the National Greenhouse and Energy Reporting (NGER) system.
 - Undertaking Energy Audits on Council owned or leased assets in accordance with AS 3598:2000. Please refer to our information sheet on Energy Audits for information on the specifications and benefits of undertaking an energy audit.
 - Undertaking Water Audits with the aim of reducing potable water consumption in buildings.
 - Conducting Energy Awareness Information or Training sessions with building occupants. Occupants have a significant impact on the way energy is used or saved in buildings. Energy can be saved by ensuring that lights and equipment are only switched on when necessary and switched off when no longer being used. A self-managed program for saving energy can be an inexpensive and effective way to make a significant inroad to meeting energy reduction targets.
 - Assisting with the development and adoption of an Environmental Management Plan .





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ENERGY MANAGEMENT PLANS (EMP)

WHAT IS AN ENERGY MANAGEMENT PLAN?

- An Energy Management Plan (EMP) is a critical management tool that clearly articulates the measures that are, or will be, deployed by an organisation (or project) to reduce energy consumption.
- The scope and coverage of an EMP can vary – it can be developed for individual buildings or facilities, through to entire building portfolios.
- An Energy Management Plan sets out how an organisation can plan, monitor and manage an ongoing energy reduction program.
- All energy management is based on the two very simple rules, “if you don’t need it turn it off”, and “if you do need it, do it more efficiently”.
- An Energy Management Plan:
 - Establishes who is responsible for energy in the organisation
 - Establishes the targets for reduction in energy use
 - Sets out a mechanism for engaging and raising awareness in staff and occupants
 - Provides direction to undertaking an energy audit(s), focusing on housekeeping and related issues
 - Defines actions required to manage, monitor and reduce energy use
 - Defines reporting mechanisms
- An Energy Management Plan could include all or some of the following strategies or activities:
 - Inform staff or occupants about the benefits of saving energy, with an emphasis on the significance of treading lightly on the planet, saving resources for future generations and being a financially responsible organisation.
 - Make the topic of energy a “sticky” agenda item at staff meetings. Give feedback on energy savings and translate the figures to tonnes of greenhouse gases to give it additional meaning.
 - Prepare a list of equipment that can be turned off during the day when it is not being used. Turning off office equipment including computers, when not being used during the day can also make significant savings.
 - Staff should be encouraged to switch off equipment at their workstations before leaving for lunch or meetings.
 - If long warm-up times on photocopiers or faxes are annoying, use the ‘stand-by’ button.
 - If you don’t want to wait for computers to boot-up, just turning off the screen can reduce the energy consumption by more than half.
 - Turn off lights and air conditioning units when they are not required, even if they are on timers.
 - Turn off fridges and freezers when not required.
 - Turn off hot water units if they are not being regularly used.
 - Enable the energy star features in equipment. Most modern office equipment has energy saving features built in under the Energy Star program. Normally these need to be activated manually. Check the equipment manuals for details on how to do this.
 - The automatic power saving options incorporated into electrical equipment are complementary to a switch-off campaign. During the day, they are a practical aid to help turn off equipment when it is not being used. However, it’s better to have equipment switched off at the power point overnight and on weekends, as this will always use less power. This applies to equipment such as printers, photocopiers, scanners, video projectors, smart screens, televisions, video machines, DVD players, microwave ovens, etc. Turning off all appliances at the power point when they are not needed can save a significant amount of energy.
 - Many appliances use standby power when they are plugged in to the powerpoint and the switch is left on. This is usually indicated by red or green lights in clocks, projectors, Televisions, DVD players etc. This can account for up to 10% of the power used in homes, and is comparable in commercial and industrial buildings.
 - Ensure that key staff members are committed and active participants in an Energy Management Plan through active participation in a program related to environmental as well as financial benefits.





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NATIONAL GREENHOUSE AND ENERGY REPORTING

NATIONAL GREENHOUSE AND ENERGY REPORTING SYSTEM (NGER)

- The National Greenhouse and Energy Reporting Act 2007 (the Act) was passed in September 2007, and established a mandatory corporate reporting system for greenhouse gas emissions, energy consumption and production. The first reporting under the Act commenced on 1 July 2008.
- What does the legislation do?
 - Provides data to underpin the environmental and financial integrity of Australia's national emissions trading scheme;
 - Reduces the number of greenhouse and energy reports required across State, Territory and Australian Government programs; and
 - Provides corporate level information to the public on greenhouse and energy performance of Australian corporations.
- From 1 July 2008, corporations will be required to register and report for the 2008-2009 financial year if:
 - They have operational control of a facility that emits 25 kilotonnes or more of greenhouse gases (CO₂ equivalent), or produce or consume 100 terajoules or more of energy; or
 - Their corporate group emits 125 kilotonnes or more greenhouse gases (CO₂ equivalent), or produces or consumes 500 terajoules or more of energy.
- Lower thresholds for corporate groups will be phased in by 2010-11. The final thresholds will be 50 kilotonnes of greenhouse gases (CO₂ equivalent) or 200 terajoules of energy.
- The requirements and obligations under the legislation are complex and detailed and it is recommended that the most up to date information is obtained prior to reporting.
- EnvironArc Design is able to assist with the assessment and preparation of any reporting required by this legislation and NGER, and in particular:
 - Identifying inclusions and exclusions, to align existing data with NGER Technical Guidelines.
 - Assessing current record keeping and data management systems with a view to developing management systems and reporting frameworks, to NGER requirements.
 - Analysing data collected to define organisation boundaries, relative to NGER Guidelines.
 - Determining the controlling corporation and obligations, where leasing or sub contractor arrangements exist.
 - Providing advice on ongoing reporting and future needs.
 - Determining and recommending preferred emissions reduction measures.
 - Recommending improvements to the management of energy and emissions related information.





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SIMPLE AND COST EFFECTIVE WAYS TO SAVE MONEY AND REDUCE GREEN HOUSE GAS EMISSIONS.

- Shade windows facing east or west with blinds, screens, trees, shade cloth or pergolas to provide shade in summer and allow the entry of the sun in winter.
- Seal doors and windows to exclude draughts to reduce heating and cooling costs.
- Fit water efficient showerheads and taps; save money without changing habits.
- Replace incandescent light globes with energy efficient compact fluorescent globes (CFLs). These are being manufactured in many different shapes and with different levels of light emission, and you will be able to find a globe that is aesthetically pleasing. The rule of "you get what you pay for" applies when purchasing CFLs. The public's acceptance of these types of globes has been marred by the influx of cheap lights that emit a cold white light and take a long time to provide a full light output.
- Check energy and water ratings before buying appliances.
- Install insulation to your ceiling spaces to save on heating and cooling bills you will not only save money you will be more comfortable.
- It is much better to provide shade to windows as external blinds, etc on the outside before the sun hits the glass.
- Install a natural gas boosted solar hot water service.
- Buy green or environmentally friendly power that is generated from the sun, wind or water. It may be a little more expensive in the short term but if enough of us do it, it will encourage further investment and research, reduce costs and help save the planet.
- Consider installing a solar electricity system which is connected to the grid, to capture free energy from the sun. Excess energy is then fed back into the grid, and just watch the meter run backwards!
- Set thermostats for heating in winter to 19-20°C, or as low as you can to feel comfortable, and in summer to 25-26°C, or as high as you can to feel cool. Every degree lower in winter and every degree higher in summer will save about 10% on your heating and cooling costs.
- Turn off all appliances, including computers at the power point when they are not needed. Many appliances use standby power when they are plugged in to the powerpoint and the switch is left on. This is usually indicated by red or green lights in clocks, projectors, Televisions, DVD players etc. These lights can consume up to 10% of power usage in a home.





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PASSIVE DESIGN

- Design your building project so that it uses passive means to minimise the need for energy for heating and cooling.
- The ultimate solution is a building designed so that it does not require energy to provide additional heating or cooling.
- Buildings that are well designed take advantage of natural energy flows to maintain liveable and comfortable conditions inside.
- The benefit of good passive design is that it will reduce energy use, and therefore greenhouse gas emissions.
- The design of the external and internal walls, floor and roof of a house or building will determine how airflow, heat gain in summer and heat loss in winter is manipulated or controlled for the best effect.
- Good design insulates internal spaces from the hot summer sun while allowing cooling airflow, and traps and stores the heat from the sun in winter.
- The costs to incorporate good passive design into a building project are minimal at the early planning stages and can pay for themselves over time through reduced energy costs.
- Passive design features will not cost anything to run, will not produce any greenhouse gases after they have been incorporated into a building and should not require any maintenance.
- All buildings or homes should take advantage of local climatic conditions. Take full advantage of site orientation and prevailing winds, and any topographic conditions such as a sloping site, views, etc.
- The fundamental principles of passive design are relatively simple but they must be applied differently to make the most of a range of climates, house types and construction systems.
- The prevailing conditions at Darwin are vastly different from those encountered at Hobart. The same type of buildings in each of these locations would require quite different design solutions to ensure that they make the most of the conditions.





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SHADING WINDOWS AND WALLS

- Shading walls and windows from direct sun in summer can be one of the simplest and most effective ways of reducing the heat load on a building.
- Clever use of shade can dramatically improve comfort conditions inside and reduce reliance on expensive air conditioning systems. This consequently saves money and reduces the production of greenhouse gases.
- Direct sun on a square metre of clear glass in a window can produce as much heat as a 900 watt radiator.
- Shading glass before the sun reaches it can reduce heat load by an incredible 90%.
- Shading of walls can also be very important as heat can also be transferred through the fabric of the external walls, particularly if the walls are a dark colour, eg red brick.
- Shading for walls and windows in summer just makes sense. It is a simple, passive means to reduce reliance on air conditioning or fans.
- Eaves are generally the simplest and least expensive shading method, providing significant protection from the hot sun in summer. However, eaves alone will not provide protection to east or west facing windows during the middle of the day. If designed properly, eaves can fully protect northern elevations during the summer, and are all that is required on most single storey houses.
- Clever design will also allow the entry of the sun in winter to warm internal spaces and make use of the sun's energy when it is most needed.
- To be effective, the design of shading must take into account the location and orientation of a building.
- Use shading on all external windows that face east, north or west. In South Australia, it can be safely assumed that windows facing due south do not need shading except, possibly, in the early morning or late afternoon. If necessary, this can be easily achieved through the effective use of trees or shrubs.
- East and west facing windows can be very susceptible to the heat generated by direct sunlight in the morning or late afternoon.
- Keep those areas of glass to a minimum and provide shade in the form of sun hoods, adjustable external blinds or louvres.
- North facing glass can be easily shaded in summer with an eave overhang of an appropriate design, horizontal awnings or pergolas. The use of a pergola covered with a deciduous vine on the north side will allow the penetration of warming sunlight in winter.
- Curtains are useful in helping to keep out heat in summer and retaining it in winter. Curtains alone are not an efficient way to keep out the heat in summer as the heat has already entered the building through the glass.
- Refer to the Fact Sheet on Glazing for information on how tinted or reflective glass can be of assistance in keeping the heat from the sun under control when external shading cannot be used.
- Use plants, trees and shrubs to provide shading in external spaces and to shade the external walls and windows.
- It is possible to provide a house with effective shading that is built into the fabric of the house and which uses passive means to provide shading in summer and allow the entry of winter sun.





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ENERGY EFFICIENT AND ENVIRONMENTALLY FRIENDLY MATERIALS

- The term “embodied energy” in materials refers to the energy used to source, manufacture, transport and eventually dispose of them.
- The materials used in the construction of a building project can represent a significant proportion of the total energy used during its life cycle. It has been reported by the CSIRO that the embodied energy used in the manufacture of the materials in a home is equivalent to 15 years of operational energy.
- Selecting the right materials for your project can significantly reduce the use of natural resources, the production of greenhouse gases and the use of energy, without adding any significant additional costs.
- This can be done through:
 - Using recycled materials
 - Minimising wastage by using modular sizes and dimensions in your building layout
 - Using materials that will require minimal maintenance during their life cycle
 - Recycling waste material from your construction site.
- Considering where and how your materials are manufactured. Using locally produced materials not only helps local and regional communities, it also reduces the cost and energy used in transporting it from its place of manufacture to your site.
- Select materials for your building that reduce the detrimental impact on occupant health from finishes emitting air pollutants and which have a low Volatile Organic Compounds (VOC) content. Materials such as glues may give off toxic emissions and can affect people with allergies. This can also apply to paints, carpets and adhesives and sealants.
- In very general terms, a timber-framed building with a timber floor and a concrete tile roof will have less embodied energy than other forms of traditional types of construction. However, this statement must be treated with caution as there is a difference of opinion on the way to calculate the amount of embodied energy in building materials and the calculations can vary enormously. The use of reused or recycled materials can change the relativities greatly.
- Where possible avoid the use of Poly Vinyl Chloride (PVC) products when building as there are limited provisions for safe recycling. Reduction of PVC in buildings was a major initiative of the Sydney 2000 Olympics.
- Use timber that has been recycled or has certified environmentally responsible forests management practices - Forest Stewardship Council (FSC) certified timber.
- Minimise or eliminate the use of products that use formaldehyde composite wood products, such as particleboards and fibreboards. Formaldehyde resin continues to emit vapour after it has hardened and has been linked to a number of health problems.
- The EcoSpecifer is a knowledge base of over 3500 eco-products, eco-materials, technologies and resources, and is claimed to be the leading global source of sustainable development & life cycle assessed green product information. The information has been developed by RMIT and is a useful guide to the selection of individual materials which are environmentally friendly.
- Consider the cost of maintaining the fabric of your building both in economic and environmental terms. For example, external unpainted brick has minimal maintenance requirements compared to many alternative painted claddings including rendering. Always think how you are going to repaint or otherwise maintain your building it after it has been constructed. If it is hard to get to then it is potentially going to be costly to repair or maintain.
- Poor maintenance can reduce the lifespan of some materials, and this is particularly so for external timbers. Poor maintenance can easily negate all the good work you did making a decision to select a material based on its embodied energy or environmental benefits.





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WINDOWS AND GLAZING SYSTEMS

- Choosing the right window and glazing systems and locating window's correctly can have a significant effect your building's demand for energy.
- If carefully designed in synchronicity with other building elements, windows can allow heat in during winter and keep it out in summer. Simple things such as minimising the glass facing the east and west and providing external shading, will greatly reduce the requirement for air conditioning and so reduce the economic and environmental costs.
- Glass is an excellent heat conductor and allows radiant heat from the sun to pass through freely. While this can be used to your advantage with careful design, it can be a big liability if overlooked. To avoid heat loss or heat gain it is important to use high performance windows, appropriately shaded outside and insulated with heavy drapes and pelmets inside.
- A shaded window facing east or west will allow approximately 900 watts of heat per square metre to pass through into the internal spaces. A single bar radiator provides approximately 1000 watts of heat.
- The amount of heat coming through a large window facing the setting or rising sun is substantial and will quickly make a room uncomfortable, especially in summer. The energy required to provide air conditioning to subdue this heat is considerable and is a waste of money and resources.
- Windows facing north can be designed with shading to provide protection in summer and allow the entry of winter sun.
- The amount of heat coming through glass can be reduced by the use of specialised glass which is able to absorb or reflect heat.
- In very general terms, the most effective way to reduce the entry of solar radiation in summer is to shade windows from the sun. This can be done using awnings, screens, eaves overhangs, pergolas, verandas etc. These will reduce the heat load through the glass by up to 70%. Tinted or reflective glass can reduce the load on the window from 35% to 80% but the results are highly dependent on the type of glazing chosen. Internal blinds will reduce heat load by 15% to 45%.
- The materials used to manufacture the frames have the greatest impact on the thermal performance of windows after glazing. Aluminium frames are strong and durable but are a good conductor of heat. Timber frames provide good insulation but require more maintenance than aluminium. Composite frames such as those that use different materials, such as PVC or timber and aluminium, can deliver the best of both worlds. However, PVC should be avoided.
- Double-glazing is more efficient than single glazing and is becoming more widespread in Australia. Windows that are not airtight will lower thermal performance. Heat gain or loss can occur by the leakage of air through the assembly or at the junction between the window frame and the walls.
- Windows for housing are rated for energy performance. The system used is known as the Windows Energy Rating scheme (WERS). The ratings are determined independently and performance is rated for both summer and winter. Stars from zero to 5 provide the means of determining the right type of window for any region in Australia.





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INSULATION

- The most important aspect of house design is to ensure that the roof, walls and floor are adequately insulated in order to prevent heat loss in winter and heat gain in summer.
- Depending on the type of construction method chosen, it will be necessary to add varying levels of additional insulation to one or more of these elements in order to provide an adequate level of comfort and in order to achieve the energy rating now required by legislation.
- Climatic conditions dictate the appropriate level of insulation required on all surfaces making up the fabric of the house or building, and is expressed in terms of an "R-value". The higher the rating, the better the insulation properties of the material.
- The most common building materials do not provide adequate insulation on their own and will require some additional insulation. However, some materials such as rammed earth or aerated concrete blocks do perform well and will not require additional insulation.
- The construction method selected for your project will dictate the amount of additional insulation required to meet or exceed the current legislative requirements.
- Insulation is made in many different forms but comes under two main headings - bulk and reflective. These can also be combined into one composite material.
- Bulk insulation includes roll or pre-cut batts, loose insulation or rigid panels and can be made of various materials including glass fibre, wool, cellulose fibre, polyester, etc. Bulk insulation is good for providing a barrier for both conducted and convected heat.
- Reflective insulation is made in the form of a thin reflective foil that comes in a roll. It has a shiny surface that is able to reflect radiant heat and therefore is more effective in summer than winter.
- It is much easier to include the required level of insulation when the building is constructed. However, insulation can be retrofitted into existing structures to improve comfort levels, which reduces energy costs and greenhouse gas emissions.
- Specify bulk insulation that avoids the use of ozone depleting substances both in its manufacture and in its composition, i.e. an Ozone Depleting Potential (ODP) of zero.
- Under the Energy Efficient Homes Package, the Federal Government is currently offering subsidies to property owners to install insulation into existing uninsulated residences. This rebate may only be available for a limited time.





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HOT WATER SYSTEMS

- The power required to heat water for domestic use accounts for approximately 25-30% of the average household's energy bill.
- Since 1 July 2008, domestic water heater installations in South Australian households have to meet greenhouse gas and flow rate performance standards.
- Most new or replacement water heaters will need to be high efficiency gas, solar or electric heat pump systems. In some cases, conventional electric and low efficiency gas water heaters will still be permitted.
- Under certain conditions both the Federal and SA State Government offer rebates for the installation of solar hot water systems. The rebate in South Australia is only available to home owners holding a Commonwealth concession card.
- There are two types of hot water systems, instantaneous and storage. Each of these can use a variety of sources to heat the water, including electricity, mains gas, LPG and solar power.
- Instantaneous systems heat water on demand to provide a continuous supply of hot water and, depending on the level of sophistication (and cost) of the system, can be installed with the ability to supply water at a specified temperature.
- Storage systems can either store hot water under mains pressure or in a header tank, where it is then reticulated by gravity to the outlets.
- The generally accepted life expectancy of a mains pressure type hot water system is 7-10 years, and 12 -15 years for an instantaneous or gravity fed system. These estimated life spans are a guide only as water quality can have a marked effect on the service life of a system. There are manufacturers who offer up to 15 year warranties on their systems.
- One environmentally friendly way to provide hot water through using solar energy. Solar hot water systems can provide up to 60-70% of hot water heating needs in Adelaide and this could increase to up to 90% in more northern locations.
- Electric heat pumps are an efficient type of electric storage water heater, extracting heat from the environment (air, water or ground) to heat water. Like solar water heaters, they cost more to purchase and install but will pay back the extra initial investment over time through reduced energy bills.
- The initial cost for solar hot water heaters is greater than for straight gas or electric heat pump type heaters. However, the systems will pay back this additional cost over time with the savings made in energy costs. The payback period for solar systems will be shorter for larger households.
- Most solar hot water systems use solar collectors or panels to absorb energy from the sun. The storage tank is usually fitted with an electric, gas or solid fuel booster that heats the water when sunlight is insufficient. Solar systems may not be as efficient in cooler parts of the State, in smaller households or where access to the sun is restricted, eg by shade from trees or other buildings. The most environmentally friendly system to use is a system that uses solar collectors and is boosted by natural gas.
- A conventional electric hot water storage system will generate approximately three times more greenhouse gas emissions than a high efficiency heat pump water heater, high efficiency electric boosted solar hot water system or a high efficiency gas hot water heater, and about six times the amount of greenhouse gas as a natural gas boosted solar hot water service.
- Set the thermostat at 60°C for storage hot water systems and between 45-50°C for instantaneous systems.
- Insulate hot water pipes to retain heat and turn off hot water systems when they are not required for an extended period. There are many configurations and types of systems available that can be matched to individual requirements.





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HEATING AND COOLING

- There are many systems on the market to both heat and cool rooms in a building or residence. A well-designed and constructed building makes the most of passive means to shade and insulate it against heat loss in winter and heat gain in summer. If this is done correctly it will require minimal additional energy to provide heating and cooling.
- There are two main types of heating - convection and radiant. Convection heating warms the air, which is then circulated around a room. Radiant heat provides heat directly to objects or occupants through the direct radiation of heat.

HEATING

- There is no single simple solution to provide heating. Each situation should be carefully assessed and analysed to ensure that the most efficient and effective system is chosen.
- Convection heating includes central heating such as ducted, hydronic or in-slab systems. Radiant heating includes electric or gas fixed or portable heaters, space heaters or fuel burning systems such as open fireplaces or combustion heaters.
- In very broad terms, high efficiency natural gas systems have the lowest running costs and produce the least amount of greenhouse gas emissions than all other systems.
- Conversely, portable electric heaters are the greatest users of energy and produce the most greenhouse gases.
- Slow combustion heaters are also rated as having low running costs and low greenhouse emissions, provided the fuel is burnt efficiently and sourced locally.

COOLING

- To assist the heating of a space and reduce costs, close all windows and doors and draw curtains at night to help reduce heat loss. Use a correctly sized heater and set the thermostat as low as possible.
- There are three main types of mechanical cooling - fans, evaporative and refrigerated air conditioning. Fans are cheap to run but they do not modify the temperature or humidity. However, for environmental reasons, they should be a first choice for cooling. Evaporative air conditioners work by cooling the air through the evaporation of water. They work best in climates where the humidity is low. They must be used with windows and doors open. The operating costs of evaporative coolers can be lower than refrigerated air conditioning as they only run a fan and small water pump.
- The third choice is refrigerated air conditioning. These systems work in any climate but they consume more energy and create more greenhouse gases than straight fans and evaporative cooling systems. For refrigerated air conditioning to work effectively, rooms and windows must be sealed.
- Thermostats are often set too low in summer which means that running costs (and greenhouse gas emissions) are much higher than if the thermostat were set a few degrees higher, say at 24-25°C. Each degree increase in the thermostat setting will save around 10% of the cooling cost.
- Purchase costs, energy costs and greenhouse gas emissions for refrigerated systems are high compared to other cooling methods.
- Efficiency varies enormously between units and models. On units up to 7.5kW there is an Energy Rating Label. The efficient units will always have a higher rating. Ensure that you choose the right sized unit in order to make the most efficient use of its capacity.
- Specify all refrigerants in a reverse cycle air conditioning system to have an Ozone Depletion Potential of zero and a Global Warming Potential (GWP) of less than 10.





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LIGHTING

- The most efficient form of lighting is natural lighting.
- There are two types of artificial lighting, fluorescent and incandescent.
- Fluorescent light globes provide the most efficient form of lighting. They may cost more to purchase but will repay this additional cost with reduced operating costs. They last up to 10,000 hours and use only one quarter of the energy used in incandescent light globes for the same amount of light output.
- Incandescent globes are much cheaper to buy than fluorescent globes but they only last up to 1,000 hours and consume more power to provide the same level of lighting than all other forms. Incandescent globes provide the least efficient form of lighting.
- Incandescent lights will be no longer available as from 2009/2010 as part of the Federal Government's push to phase out inefficient lighting technologies and to ensure only energy efficient forms of lighting are used.
- Compact fluorescent globes have been subjected to some criticism since their introduction due to the poor colour of the light they emitted. This was due to some very low quality lamps being sold when they were first introduced. The "warm" colour lamps now readily available are close to the quality of light from incandescent globes. The Federal Government is about to bring in some quality and efficiency standards for this type of lamp.
- Halogen lights are more expensive to buy than standard incandescent globes but they last approximately 2,000 hours. Low voltage halogen lights are not energy efficient lights. A large amount of energy is used in the transformers, particularly in the older style units, and care must be taken not to cover them with insulation as heat builds up and can result in a fire. Improvements in the efficiency of these types of lighting are being made all the time, particularly the efficiency of the transformers.
- Energy efficient lamps are also now available to replace the standard type halogen globe. Infrared-coated (IRC) lamps rated at 35w are available to replace the 50w standard lamps. LED globes are now also available and consume a mere 5w, but both of these are still fairly expensive. They also produce lower levels of lights than the other lamp types but where light levels can be reduced, they are certainly worth considering. The cost for LEDs will inevitably come down as demand increases.
- In a comparison of life cycle costs over a period of 10,000 hours providing the same lighting level, compact fluorescent lights were approximately half the cost to run than both halogen and incandescent lights, with incandescent lights being slightly higher to run than halogen lights.
- Dimmers on incandescent lights can save energy but a light dimmed down to a quarter of its output still uses half the power. If lights are always dimmed it is better to use a lower wattage globe. Although most fluorescent lamps cannot be dimmed, there are some special dimmers and lamps now available.
- Provide as many switches as it is practical to operate individual lights in a room. This will enable them to be used efficiently and allowing only the required amount of lights to be turned on.
- Use motion sensors or other devices to switch external security lighting on or off. These devices can also be useful to turn off internal lights when rooms are no longer occupied.
- Solar lights are now available that are controlled by motion sensors and can be used for security lighting. Consider using the smaller portable versions for lighting paths in the garden.





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MINIMISING ENERGY USE

- Carbon dioxide (CO₂) is the main greenhouse gas, and the average household's energy use produces about seven tonnes annually. Many of these emissions can be reduced through the more efficient use of energy.
- The selection of the right type of lighting, hot water heaters and appliances can bring some of the most significant reductions to the production of greenhouse gasses and energy use.
- Minimising demand for energy through conservation and efficiency is the most cost effective means of reducing operational and environmental costs for all property owners.
- Energy consumption is influenced by three main factors:
 - Building fabric (25%)
 - Building services (25%)
 - Building occupants' behaviour (50%)

"Sustainable Energy Authority Victoria's 'Building Energy Brief for Commercial and Public Buildings' (Version .3, Jan 2003)"
- Heating and cooling, appliances (such as refrigerators, televisions and computers) and water heating use the most energy and generate the most greenhouse gas emissions.
- Standby power (the little red and green lights and digital clocks that stay on in appliances) can make up 5 -10% of the total energy bill.
- Buy green power, install a solar hot water service and install solar panels to provide power to your buildings or home to reduce the generation of greenhouse gases. Initially, these may be more expensive to install but will pay for themselves over time. There are varying Government subsidies to offset some of the establishment costs.
- Green Power is produced from renewable resources and produces no greenhouse gases in operation. It also reduces the requirement for power stations that burn fossil fuels. Most electricity retailers offer an option to purchase green power, albeit usually at a slightly higher cost. Check the details as not all companies offer 100% green power.
- There are rebates and subsidies for installing solar power through the Federal Government. The Solar Homes and Communities Plan provides cash rebates for the installation of solar photovoltaic systems on homes and community use buildings.
- Natural gas produces only about one third of the greenhouse gas emissions of coal fired generators.
- Liquefied Petroleum Gas (LPG) produces the same amount of greenhouse gases but costs approximately twice as much as natural gas and must be transported to its point of use.
- Nuclear power is something that is being discussed as a solution to providing a significant amount of Australia's energy while reducing the impact on greenhouse gas production. This is a subject that generates many emotions regarding safety and the long term problem of waste disposal.
- Reducing the demand for energy through clever design of buildings along with their prudent use can make a significant difference to the cost of energy and the production of greenhouse gases.





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MINIMISING ENERGY USE (Continued)

- The main sources of household energy are electricity, natural gas and wood. A small number of homes use LPG, coal, coke or heating oil.
- Energy can come from either renewable or non-renewable sources. Renewable sources such as solar, wind and hydro power are naturally replenished and produce very few greenhouse gas emissions when operating. Non-renewable energy comes from diminishing stocks of fossil fuels and can produce large amounts of greenhouse gases.
- Most electricity comes from coal-fired power stations that release high levels of CO₂ and other pollutants into the environment. Losses in the transmission system from the power station to your home also create inefficiencies.
- Hydro electricity generated in Tasmania directly produces almost no greenhouse gas. However, the construction of new large-scale hydroelectric dams can be sources of large amounts of greenhouse gas and may have other adverse environmental effects.





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APPLIANCES

- Power to run electrical appliances, including electric stoves and refrigerators in a home accounts for up to 40% of energy use.
- Refrigerators, freezers, washing machines, dishwashers, air conditioners and clothes driers all have an Energy Rating Label. These labels also give an indication of the amount of energy that will be used under standard conditions over one year. The more stars, the more efficient the appliance will be in terms of energy usage.
- There are currently no rating labels for ovens.
- Maintain appliances to keep them running in good order. An appliance in a poor state will be less efficient than one that is well maintained and in good condition.

COOKING

- Gas cook-tops are generally more efficient than electric. They use energy more efficiently, are cheaper to run and are more easily controlled.
- The use of electricity for cooking is a less efficient way to use fossil fuels for cooking than using natural gas. In very general terms, a gas oven or cook-top will produce half the greenhouse gases than equivalent electric units. However, there are some very efficient electric models available and if you don't have access to gas then they are worth taking the trouble to find.
- Fan forced ovens are about 30 percent more efficient than conventional ovens.
- Microwave ovens use about half the energy than conventional ovens.
- When buying an oven look for those with good insulation and triple glazing.

- Use small appliances, such as microwave ovens, electric kettles, electric frypans, mini ovens, etc as they are more energy efficient than a large oven.

REFRIGERATION

- Choose a refrigerator with a high star rating and make sure that it is no larger than you need. A larger model will always use more energy than a smaller one with the same energy rating.
- Place the refrigerator in a cool place in the kitchen, away from direct sunlight and any other heat sources such as an oven. Always ensure that the back and sides of the fridge are adequately ventilated to allow for the dispersal of the heat generated from the compressor. Always follow the manufacturer's recommendations.
- Ensure that the door seals are in good order and replace them if they are worn or if there are any gaps.
- Don't open the door unnecessarily and don't leave it open for any longer than is required.
- If you have a second fridge, turn it off when it is not being used or preferably get rid of it (in an environmentally appropriate way - contact your Local Council if you need advice on how to do it properly).
- Defrost the refrigerator regularly and set the temperature of the refrigerator to cool between 3°C-5°C. Set the thermostat in the freezer a temperature between -15°C and -18°C. Every degree lower than this will use significantly more energy.
- A chest freezer is more energy efficient than an upright one.





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APPLIANCES (Continued)

CLOTHES WASHING AND DRYING

- Choose a washing machine with a high star rating for both energy efficiency and water usage.
- Front loaders can be very efficient users of energy and water, however there are now top loaders on the market that are starting to get efficiency ratings very close to those of front loaders.
- Wash clothes in cold water and dry clothes in the sun whenever possible.
- Use full loads when washing.
- Use the dryer sparingly, and clean the lint filter and vent piping regularly.

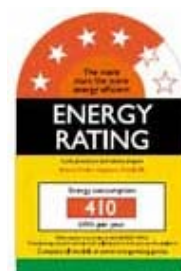
DISHWASHING

- Purchase a dishwasher with a high star rating.
- Only use the dishwasher when it is full. Scrape plates clean and do not rinse them under the tap. If you have to do it, avoid using hot water.
- Use the shortest cycle and lowest temperature that will satisfactorily clean dishes. Use the economy cycle if possible.
- Purchase a unit that has both cold and hot water connections. This will allow cold, not hot water to be used during rinse cycles.
- Open the door to dry the dishes.
- Clean the filter after each wash.

STAND-BY POWER

- Stand-by power is energy that is consumed by appliances when they are not being used for their primary function.

- Many appliances, such as TVs, DVD players, computer monitors, digital TV receivers, microwave ovens, faxes, scanners, printers, battery chargers, ovens etc, all commonly use power to run clocks or maintain memory settings, or enable a quick start-up or to use a remote control. Often, this is just wasted energy and it is better to turn these off at the power point if they are not being used.
- Stand-by energy can account for up to 10% of a household's energy bill.
- Some appliances such as DVD players and VCR's will use more energy per year on standby than they will use in actual use.
- When you buy an appliance such as a fax machine, computer or printer, look for an Energy Star label. This designates whether an appliance meets the standards for energy consumption while the appliance is not being used. Using appliances that have an Energy Star rating will lower the use of stand-by power. However, it is not an indicator of the unit's efficient use of power while in operation.
- It is proposed in the future to use Energy Rating Labels for the standby power consumption of appliances such as dishwashers, clothes dryers, washing machines etc.
- A computer, printer, scanner, a 68 cm TV and a DVD player will consume approximately 450 kWh of energy per year in standby mode if left on.
- Switch off computers and printers if you won't be using them for half an hour or more.
- Switch off equipment at the wall instead of leaving in standby mode, every night if you can and especially when you go on holiday.





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WATER USE/REUSE

- South Australia is the driest state in the second driest continent in the world. The ongoing drought means that our rainfall is not going to be reliable and the Murray River will not be able to provide water on an unlimited use basis. Water restrictions are here to stay even with the construction of a desalination plant. The need to be prudent with water use for domestic purposes will become a necessary part of our daily lives to avoid a repetition of the problems that we are currently facing.
- Save water wherever possible, as it will reduce the demand on our diminishing supplies and save you money.
- Use AAA rated shower heads and take shorter showers. Collect the water that is wasted before the hot water arrives and use it in the garden.
- Install a dual flush toilet cistern, if you don't already have one.
- Fix leaking taps and pipes.
- By reducing the amount of water going down the drain you will also reduce the amount of wastewater going into the sewerage system, and the amount of energy used to treat it.
- Install a rainwater tank if you don't already have one. Connect it to the house and use it for flushing the toilet, watering the garden or for drinking (but get it tested first). Some properties in rural areas are totally dependant on rain water.
- There are two types of waste water generated in a home, grey water and black water. Grey water is waste water from the bathroom and laundry and black water is waste water from a toilet or kitchen.
- Grey water requires less treatment than black water as it contains fewer pathogens. It can be reused on the garden, but should never be stored before it is treated as it can turn "sour" after only a few hours.
- Black water requires biological or chemical treatment and disinfection before it is able to be reused outdoors.
- Always get the right advice and approvals before attempting to reuse or recycle both grey and black water.
- Adhere to the current level of water restrictions. Read the newspapers or search the appropriate website to ensure that you are complying with the latest set of water saving measures.
- To help you choose the most water efficient appliances, Australia has introduced national mandatory water efficiency labelling and standards Water Efficiency Labelling Standards (WELS).
- This applies to all showerheads, washing machines, toilets, dishwashers, urinals and some types of taps. In addition, the scheme includes minimum water efficiency standards for toilets and voluntary water efficiency labels on flow control devices.
- Under this scheme, you can tell at a glance how water efficient the product is - the more stars on the label, the more water efficient.
- Purchase products and services that display the "Smart Approved WaterMark". This will ensure that you are buying water saving products or services that will help reduce outdoor water use.
- The Home Rebates Scheme in South Australia provides subsidies for undertaking water audits or the installation of low flow showerheads, water efficient washing machines, water efficient garden goods, retrofitting dual flush toilets and rainwater tanks. These rebates are all subject to certain conditions.
- For South Australian residents the SA Water website provides valuable information on water.





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BUILDING MANAGEMENT SYSTEMS

- Poor energy efficiency in office buildings and in homes can be reduced through good design and the use of a Building Management (or Home Automation) System.
- Building Management System (BMS) is a generic term for any system that is used to monitor and control the services used in a building. These services may include any appliance or equipment, including lighting, air conditioning, security, blinds, hot water systems and water.
- A BMS uses a computer or a digital processor to provide control over how and when the systems operate. It is set to respond to changes in the environment or can be controlled manually via a connection on the internet. For example, it can
 - turn air conditioning or lighting systems on and off based on time or environmental conditions
 - monitor energy use
 - reduce energy waste and make a significant contribution to lowering the running cost and the environmental impact of a building
 - generate alarms to alert of potential problems in plant or equipment
 - provide detailed logs and reports to enable the impact of any changes to be monitored and measured
 - enable monitoring and control of systems offsite.
- A BMS can range from a simple system with limited controls to very complex system that can integrate and manage systems across a number of buildings or facilities. The systems can be hard wired or wireless.
- The technology being developed and used in Building Management Systems is becoming increasingly sophisticated. Some require specialist knowledge to manage at a micro level, so it is important to choose the right BMS that enables you to manage your building easily and effectively without external support. A system that is simple to operate and is user friendly will ensure that it is used to its fullest potential.
- Buying bigger is not always better. A BMS will use power to operate, so it is important to ensure that it will save more power than it uses.
- The full benefits of a BMS will only be obtained if it is properly specified, selected, installed, commissioned, managed and maintained.
- The benefits of a BMS to the users/tenants of buildings include:
 - efficient use of resources and energy
 - effective monitoring and targeting of energy use
 - good control of comfort conditions
 - improved proactive maintenance of plant reliability.
- Use a qualified and experienced professional to assist making the correct decisions about which BMS to specify. Above all, specify a system that has been tried and tested and is based on your understanding of its capacity and the inherent set up and running costs.
- Do the homework and choose a system that is user friendly and has an open-architecture and standard protocol. This will enable your system to communicate and integrate with other systems as they are needed or become available.





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REDUCING, REUSING AND RECYCLING WASTE

- The need to reduce the amount of waste going to landfill and to recycle and reuse as much of our waste material as possible, is widely accepted and understood.
- This also applies to the waste that is generated from the construction, use and demolition of buildings. It has been calculated that as much as 40% of the solid waste going to landfill is generated from the various stages in the life cycle of buildings.
- The benefits of reducing, reusing and recycling waste are significant.
 - It can reduce the need for landfill where all of the attendant problems of community acceptance, ground water contamination, production of methane, vermin and bird problems, dust, odour, etc need to be dealt with appropriately and sensitively.
 - It reduces the draw on natural resources.
 - It reduces the production of methane which is a by product of waste sites. Methane is one of the principle greenhouse gases, along with carbon dioxide and nitrous oxide. However, some waste sites do now capture methane and burn it to produce electricity with a net reduction in greenhouse gases.
- Most Councils now provide separate bins for putrescible (household) waste, recycled materials and green organics. The opportunity now exists for householders along with commercial entities, to participate in the recycling of a wide range of materials.
- Every new house that is built produces on average, 4 tonnes of waste, and the demolition of an average sized house produces about 150-250 tonnes of waste.
- The building construction industry currently recycles some materials such as concrete, timber, bricks, asphalt, plastics, cardboard, etc but there is more scope for improving how building materials are specified, used, reused and recycled.
- What can you do if you are about to construct or extend a house or commercial property and you are interested in minimising waste through reducing, recycling and reusing materials?
 - Determine what goals you would like to achieve regarding waste minimization prior the engagement of any consultants or builders.
 - Find out what current standards and practices are used in the construction industry. The Green Building Council of Australia (GBCA) might be a useful place to start .
 - Select a building designer or architect who has accreditation under the Green Building Council of Australia (GBCA). The GBCA provides minimum standards for managing waste on construction sites and is committed and knowledgeable about how to design and specify a building to minimise waste and control the impact a building can have on the environment.
 - Gain an awareness of materials that are environmentally friendly. Refer to the Fact Sheet on "Energy Efficient Materials".
 - Ensure that your goals for waste minimisation are maintained throughout the design, construction and operational stages of your project. You will need to be vigilant and relentless if you wish to achieve your goals.





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REDUCING, REUSING AND RECYCLING WASTE (Continued)

■ What can building designers and architects do?

- Gain accreditation under the Green Building Council of Australia to apply the skills, knowledge and understanding of current practices in building green under the Green Star rating system.
- Understand and apply these principles to minimise waste and use energy efficiently in the design, construction, operational and demolition stages.
- Acknowledge, promote and embrace the core values and benefits of waste and energy minimisation.
- Select building systems and materials that minimise waste in their manufacture and installation.
- Use recycled materials.
- Use dimensions to suit standard sheet or modular sizes of materials.
- Select suppliers with a recycling strategy and incorporate recycling of materials in the manufacturing process.
- Establish good working relationships and engage like minded professionals such as engineers, landscape architects, builders, etc.
- Specify resilient materials and finishes that are easy to maintain and have a minimal impact on the environment both in manufacture and use.
- Incorporate a requirement for waste management plan in the contract documents.

■ What can builders do?

- Acknowledge, promote and embrace the benefits of waste and energy minimisation.
- Prepare a waste management plan for each site.
- Engage subcontractors who actively promote and use waste minimisation practices.
- Manage waste on site to ensure that all waste materials are recycled or reused by providing recycling skips and ensuring that all subcontractors comply with the waste management plan.
- Fine tune estimating and ordering of materials to reduce waste.
- Obtain ISO14001 Environmental Management accreditation.





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Helpful links

NABERS

www.naber.com.au

Green Building Council

www.bgca.org.au

ICLEI Global

www.iclei.org

Zero Waste Alliance

<http://www.zerowaste.org/>

